(No Model.) 2 Sheets—Sheet 1.

J. H. SHAW.

LIQUID DOOR CHECK.

No. 540,518. Patented June 4, 1895.

Fig. 1

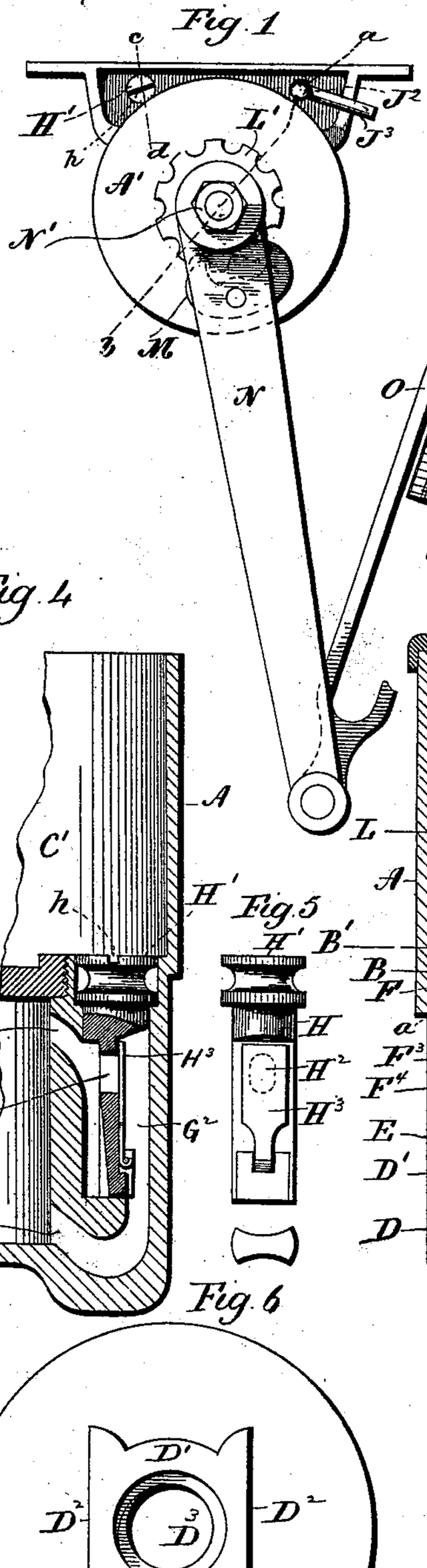

Fig. 2

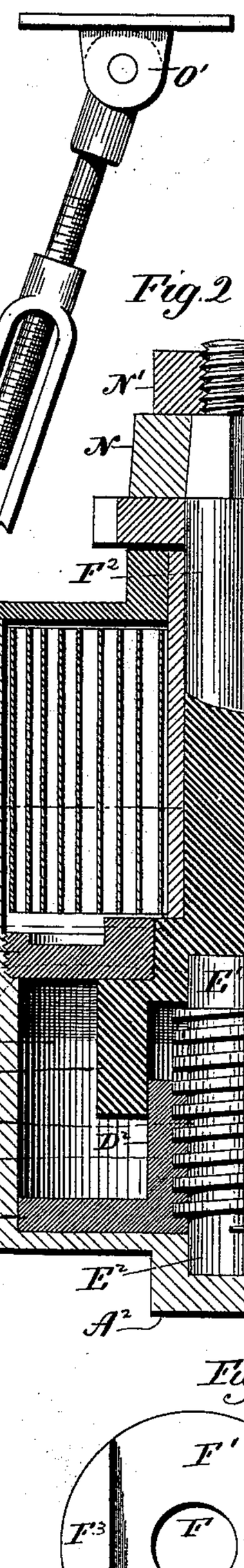

Fig. 3

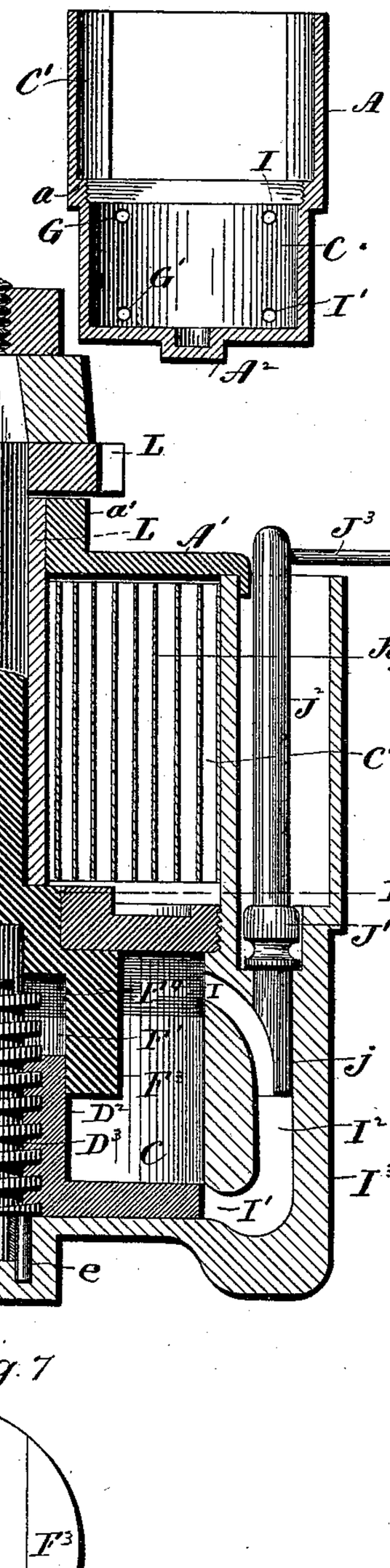

Fig. 4

Fig. 5

Fig. 6

Fig. 7

Witnesses.
J. H. Shumway
Lillian D. Kelley.

John H. Shaw,
Inventor.
By Atty
Edwin Heymour

(No Model.) 2 Sheets—Sheet 2.

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Fig. 9

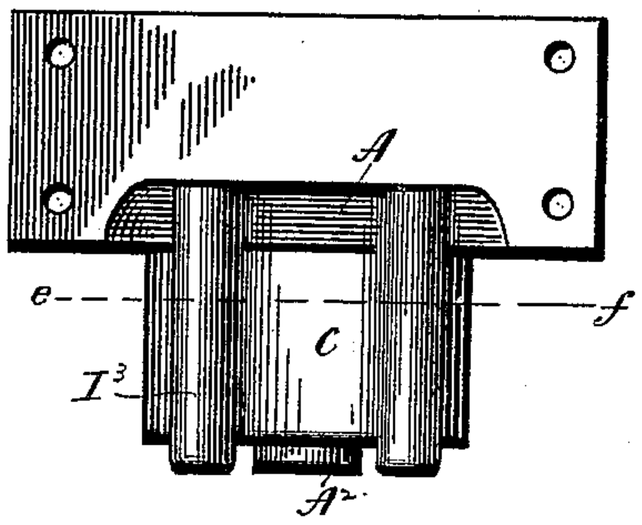


Fig. 8

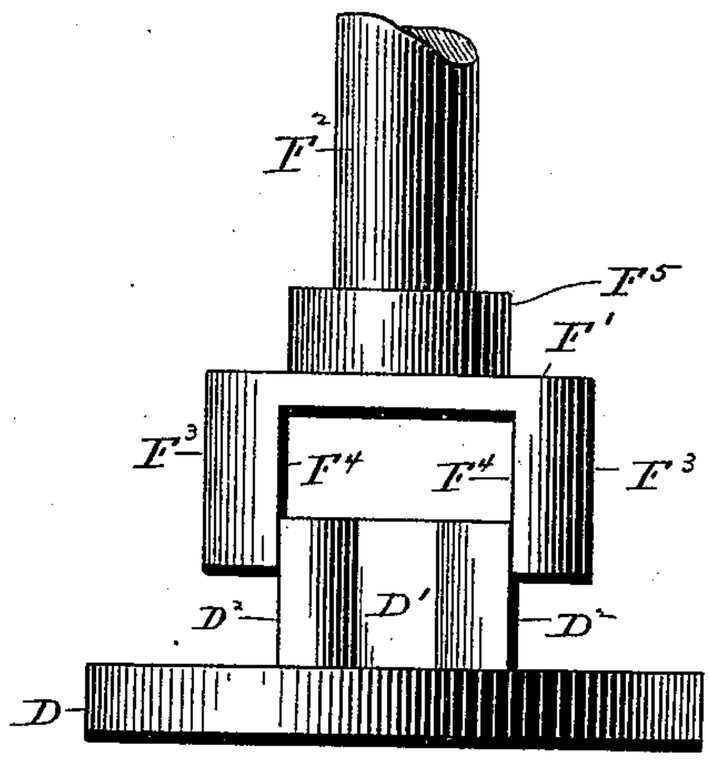
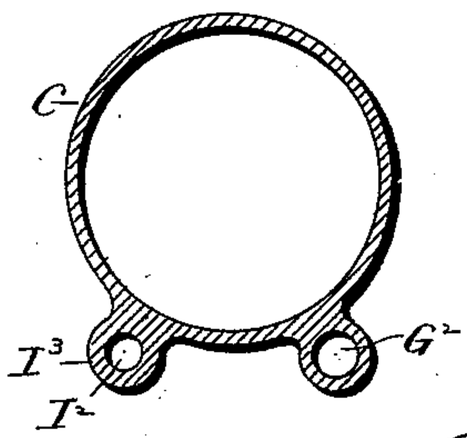


Fig. 10



Witnesses,
J. H. Shumway
Lillian D. Kelsey.

John H. Shaw.
Inventor.
By Atty
Earle Seymour

UNITED STATES PATENT OFFICE.

JOHN H. SHAW, OF NEW HAVEN, CONNECTICUT, ASSIGNOR TO THE SARGENT & COMPANY, OF SAME PLACE.

LIQUID DOOR-CHECK.

SPECIFICATION forming part of Letters Patent No. 540,518, dated June 4, 1895.

Application filed November 26, 1894. Serial No. 529,971. (No model.)

To all whom it may concern:

Be it known that I, JOHN H. SHAW, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Fluid Door-Checks; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a plan view of one form which a door-check constructed in accordance with my invention may assume; Fig. 2, a full-sized view, in vertical section, on the line *a b* of Fig. 1; Fig. 3, a detached view, in vertical central section, of the case or cylinder of the check, the same being shown on the same scale as Fig. 1; Fig. 4, a broken view, in vertical section, on the scale of Fig. 2, but on the line *c d* of Fig. 1, and showing the ports, valve-chamber, and valve of the device; Fig. 5, a detached view of the valve; Fig. 6, a detached view of the plunger; Fig. 7, a detached reverse plan view of the spindle, only the yoke thereof being shown; Fig. 8, a broken view, in side elevation, of the spindle and plunger; Fig. 9, a view of the case in rear elevation on the scale of Figs. 1 and 3; Fig. 10, a view in horizontal section on line *e f* of Fig. 9.

My invention relates to an improvement in fluid door-checks, which are that class of checks in which a fluid is employed to secure the soft closing of the door to resist the power of the door-spring, the object being to produce a durable and effective device, composed of few parts, and not liable to derangement, and adapted to be converted for use on doors opening to the right or left.

With these ends in view, my invention consists in a fluid door-check having certain details of construction and combinations of parts as will be hereinafter described, and pointed out in the claims.

In carrying out my invention, as herein shown, I employ a heavy cylinder or case A, adapted, in the usual manner to be applied to a door, having its lower end closed, and its upper end furnished with a removable cap A′. Within this cylinder I locate a horizontal diaphragm B, having external peripheral threads, which match into corresponding threads formed in the cylinder, which is constructed with an annular shoulder *a*, upon which the diaphragm rests. The said diaphragm divides the cylinder into a fluid-chamber C, which is located below it, and into a spring chamber C′, which is located above it.

Within the fluid-chamber C, I locate a vertically and rotatably movable plunger D, having a smooth periphery, which works directly against the smooth inner walls of the chamber, the joint between which and the plunger is as close as can be made without interfering with the free movement of the latter. The upper face of the plunger is provided with an integral centrally arranged coupling-head D′, having two corresponding parallel working faces D^2 D^2, and a centrally threaded opening D^3, which passes down through the body of the plunger. A threaded post E, reduced at its upper and lower ends to form bearings E′ and E^2, is located in an upright position in the center of the fluid-chamber, and passes through the centrally threaded opening D^3, formed in the plunger and the coupling-head thereof, as described, the threads of the post matching into those of the opening. The bearing E^2 formed at the lower end of the post is set into a depending step A^2, formed integral with the bottom of the casing. Within the said step I locate a key *e*, which enters a vertical slot formed in the said bearing for holding the post against rotation. The reduced bearing E′ formed at the upper end of the said threaded post, enters a socket F, formed in a yoke F′, located within the fluid chamber C, and made integral with the inner end of the spindle F^2. The said yoke has two corresponding coupling members F^3 F^3, having parallel operating faces F^4 F^4, corresponding in their separation to the separation of the faces D^2 D^2 of the coupling-head of the plunger, the said faces of the coupling-head and yoke being adapted in width to cover the movement of the plunger up and down in the fluid chamber, as will be set forth later on. Between the spindle F^2 and the yoke F′, there is formed a bearing collar F^5, which is integral with them, and which has bearing in a central opening B′ formed in the diaphragm B.

It will be understood that within the fluid-chamber C, I by preference locate some heavy liquid, such as glycerine, which in the operation of the check is transferred from one side of the plunger to the other, flowing freely in one direction, and under restraint in the other, as will be set forth. For the free transference of the fluid from the upper to the lower end of the chamber, I form in the wall of the fluid-chamber two ports G and G′, respectively located near the upper and lower ends of the chamber, and terminating at their outer ends in a vertical valve-chamber G^2, formed in an integral, vertically arranged offset from the lower portion of the case A. In this chamber I locate a valve, comprising, as herein shown, a body H, furnished at its upper end with a slotted cylindrical head H′, the slot *h* whereof is adapted to receive a screw-driver, by means of which the valve may be reversed in position, as required for converting the check for use on right and left hand doors. The body of the valve is cut away on its opposite faces, and constructed with a valve opening H^2, through which the fluid passes in being transferred from one side of the plunger D, to the other. The said valve also has a pivoted sheet-metal flap H^3, pivoted at its lower end, and bearing against one of the cut away faces of the body, so as to close the opening H^2.

The valve shown and just described, is well adapted for use in my improved check, but I do not limit myself to its use, as it might be replaced by other valves adapted to operate in the same or substantially the same way. I may here say that when the check is to be used in combination with a door opening to to the right, the valve is turned with its flap outward, whereby the fluid is permitted to flow freely from the upper portion of the chamber into the lower portion thereof, and below the plunger, which is elevated during the opening movement of the door, and occupies an elevated position at the beginning of the closing movement thereof. The passage of the fluid will be through the port G, into the valve-chamber G^2, then through the valve opening A^2 into the lower portion of the valve-chamber, then through the port G′ into the fluid-chamber. On the other hand, when the door to which the check is applied opens from left to right, the valve is turned so that its flap will be on the inside, and permit the fluid to flow freely from the lower to the upper portion of the chamber, which is then unoccupied, because the opening of the door to the left will secure the depression of the piston, which will be depressed at the time the closing movement of the door begins. When the valve is turned with its flap inward, as described, the fluid will flow from the lower end of the fluid-chamber into the port G′, then into the lower portion of the valve-chamber, then through the opening H^2 of the valve, into the upper portion of the valve chamber and then through the port G′ into the upper portion of the fluid chamber. The return passage of the fluid is controlled and takes place much more slowly, provision for it being made by forming a vent opening I, in the upper portion of the wall of the fluid-chamber, and a corresponding opening I′ in the lower portion of the wall of the said chamber, these openings terminating at their inner ends in a vent passage I^2, formed in a vertically arranged integral projection I^3, located upon the lower portion of the case, as clearly seen in Fig. 9. The virtual size of the vent passage I^2, is controlled by means of a vent-plug J, having a head J′, fitted into the upper end of the passage, and constructed with a long stem J^2, furnished at its upper end with an outwardly projecting handle J^3, which extends above the top of the case A, in position to be readily manipulated by hand, so as to control the return passage of the fluid when the same is under the pressure of the plunger. The vent plug is cut away, as at *j*, and its position in the passage I^3 determines the amount of fluid which may flow through the same. I will say, however, that this vent plug may be varied in construction, or replaced by any other device, which will control the restrained passage of the fluid from one side of the plunger to the other. I conceive that both the valve and vent plug might be changed or omitted, without altering the essential operation of the plunger and spindle, as will be described later on.

Within the spring-chamber C, I locate a heavy spring K, the outer end of which is connected in the usual manner to the cap A′ of the case, while its inner end is connected with a sleeve L, which forms a long bearing for the spindle F^2, and which is provided at its upper end with a notched hub L′ bearing upon the central upwardly projecting boss *a*′ of the cap A′. The said slotted hub is engaged by means of a pawl M pivotally secured to the lower face of the door-lever N, the inner end of which is set over the squared upper end of the spindle, which is thus virtually connected with the inner end of the spring through the medium of the said lever N, the pawl M, the hub L′ and the sleeve L. The inner end of the door-lever, I would observe, rests upon the upper face of the hub L′, and is held down thereupon by means of a nut N′. The outer end of the door lever has connected with it an adjustable casing-lever O, the opposite end of which carries a bracket O′, adapted to be connected with the casing of the door. I would have it understood, however, that I do not limit myself to any particular way of connecting the door spring with the case or spindle, nor to the employment of any particular construction of door and casing-levers, as these devices are well known and may be varied.

Having thus described the construction of one form which a door-check made in accordance with my invention may assume, I will proceed to set forth the mode of its operation. Assuming that the check is applied to a door opening from right to left, the plunger D will be located in the bottom of the fluid chamber

with the fluid above it, when the door is in its closed position. When now the door is opened, the spindle F^2 will be rotated against the tension of the door spring K, whereby the yoke F′ at the lower end of the spindle will be rotated, and cause the plunger to be rotated, and therefore lifted by the co-action of the threads within its coupling head with the threads of the fixed post standing upright in the fluid chamber. The sliding movement between the yoke and the coupling-head of the plunger permits the plunger to be lifted without being disengaged from the spindle, at the same time the plunger is being spirally rotated. As the plunger rises, the fluid located above it escapes into the port G, and flows freely through the valve in the valve-chamber G^2, and emerges into the lower portion of the chamber at a point under the plunger. It will be understood that when the door is fully open, the plunger will be at its highest point. Now when the door begins its closing movement, the plunger will be depressed against the fluid in the lower portion of the chamber, and the said fluid will at once be put under considerable pressure, tending to force it back through the ports G′ and G into the upper portion of the chamber, but there is no passage for it in that direction, inasmuch as the flap H^3 automatically closes and obstructs the flow of fluid, which is therefore forced to find another passage into the upper portion of the fluid chamber. The fluid, therefore, enters the vent opening I′, and flows through the passage I^2, past the vent plug J, and emerges into the upper portion of the fluid-chamber; but the passage last described is so small that the fluid flows very slowly, and inasmuch as the plunger cannot descend except as room is made for it by the discharge of fluid from the lower portion of the fluid-chamber, the closing movement of the door will be restrained and checked, for just in the proportion that the downward movement of the plunger is checked, so also is checked the rotation of the spindle F^2, without which there can be no movement of the door. The closing movement of the door will therefore be checked by the restrained or controlled transference of the fluid from the lower to the upper portion of the fluid chamber, and that transference will be comparatively rapid, or slow, according to the setting of the vent-plug, which may be arranged to allow the door to close at any rate desired, and with reference to the power of the door spring, and to other causes which may enter into the problem of setting the check.

I would call attention to the fact that when the check is set for operation upon a door opening from right to left, the great strain imposed by the fluid when under pressure is exerted against the bottom of the case, which is made integral therewith. The strain therefore is well resisted, and the case is not liable to burst, and cannot leak. It is conceived that there will be some little leakage of fluid between the plunger and the side walls of the fluid-chamber and between the threads of the coupling head and threaded post, but that leakage may be compensated for, and will not interfere with the successful operation of my device.

In view of the changes suggested, and of others which may obviously be made, I would have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a fluid door-check, the combination with a case having a fluid chamber, of a plunger located therein, a non-rotatable screw-threaded post located in the said chamber, and passing through the plunger which has threads matching into its threads, and means engaging with the plunger for rotating it whereby it is moved back and forth in the chamber through the medium of the post, substantially as described.

2. In a fluid door-check, the combination with a case containing a fluid-chamber, of a longitudinally movable and rotatable plunger located in the said chamber, and constructed with an internally threaded coupling-head, a non-rotatable threaded post located in the said chamber, and passing through the internally threaded coupling-head of the plunger, and a spindle furnished with a yoke co-acting with the coupling-head of the plunger, and operating when rotated to raise and lower the same, substantially as set forth.

3. In a fluid door-check, the combination with a case containing a fluid chamber, of a longitudinally movable and rotatable threaded plunger located therein, a non-rotatable threaded post located in the said chamber and having its threads matched into those of the plunger, and a spindle constructed to engage with the plunger to rotate the same and cause it to move longitudinally in the chamber, through the medium of the threads upon the post, one end of which has bearing in a portion of the spindle and the other in the case, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOHN H. SHAW.

Witnesses:
JOHN SARGENT,
WILLIAM S. COOKE.